

Surface area to volume ratio of prisms

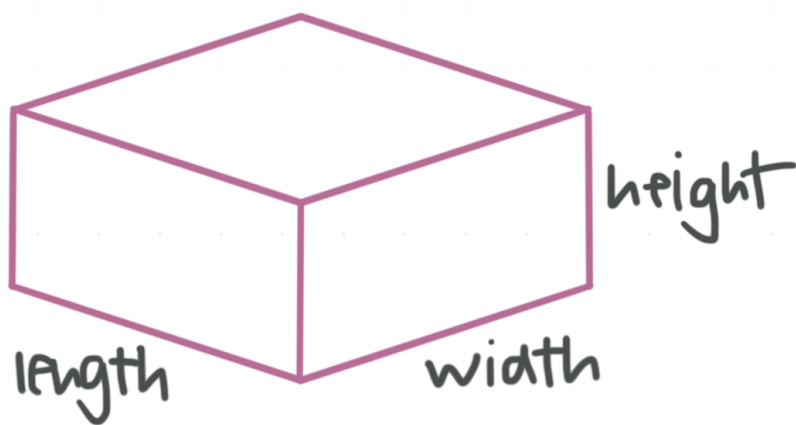
Remember that the surface area of a right rectangular prism is given in the table:

Top and bottom	length x width
Left and right	width x height
Front and back	length x height

The formula for surface area of a rectangular prism is

$$A = 2lw + 2wh + 2lh$$

And the volume of a rectangular prism is the length times the width times the height.



$$V = lwh$$

Surface area to volume ratio

The ratio of the surface area, S , to the volume, V , can be expressed as a fraction S/V , or converted to a decimal.



Let's start by working through an example.

Example

Calculate the surface area to volume ratio of a right rectangular prism that measures 4 cm high, 6 cm wide, and 8 cm long. Express your answer as a decimal rounded to the nearest tenth.

Use $A = 2lw + 2wh + 2lh$ to find the surface area.

$$S = 2 \cdot 8 \cdot 6 + 2 \cdot 6 \cdot 4 + 2 \cdot 8 \cdot 4$$

$$S = 208$$

Use $V = lwh$ to find the volume.

$$V = 8 \cdot 6 \cdot 4$$

$$V = 192$$

Now find the ratio of surface area to volume.

$$\frac{S}{V} = \frac{208}{192} = \frac{13}{12}$$

As a decimal rounded to the nearest tenth, the ratio is 1.1.

Let's do another example.



Example

The surface area to volume ratio of a right rectangular prism is $11/20$. The volume of the prism is $1,140 \text{ feet}^3$. What is the prism's surface area?

We know

$$\frac{S}{V} = \frac{11}{20}$$

and that the volume is $V = 1,140 \text{ feet}^3$. The surface area is

$$\frac{S}{1,140} = \frac{11}{20}$$

$$\frac{S}{1,140}(1,140) = \frac{11}{20}(1,140)$$

$$S = 627 \text{ feet}^2$$

